

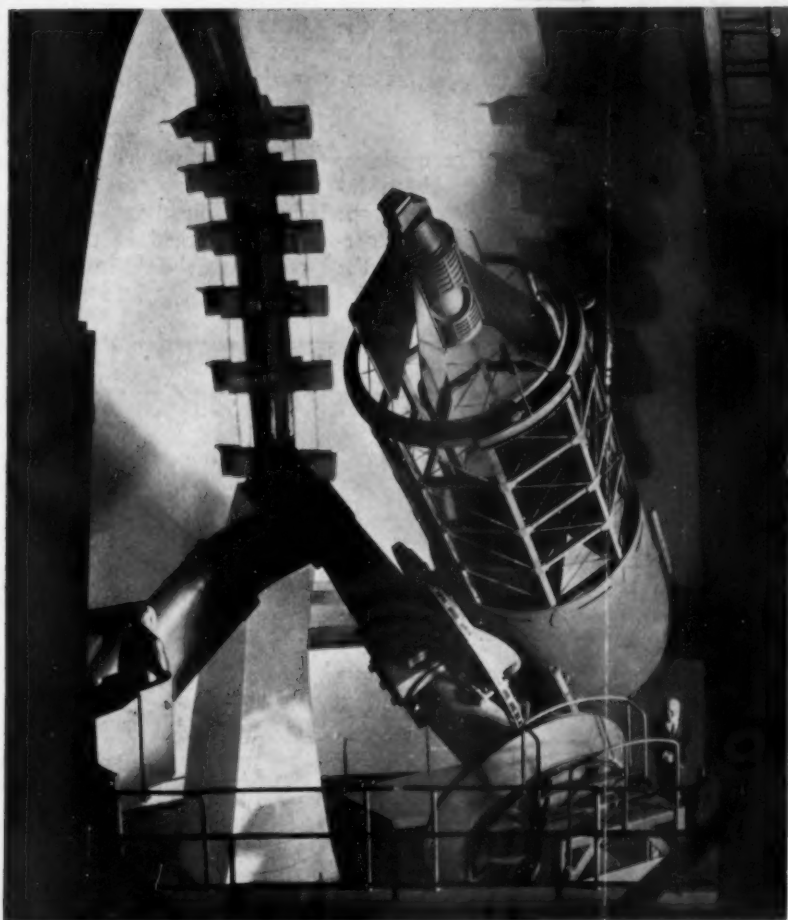
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE.



JANUARY 18, 1936

Telescope Model

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VOL. XXIX

No. 771

The Weekly Summary of



Current Science

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DO YOU KNOW?

Lunar eclipses can occur only when the moon is full.

Baked beans can now be baked in 20 minutes, says Cornell University, since pre-soaked and partly cooked beans are on the market.

A new bird food, devised to help pet birds get a balanced ration, is said to contain milk as a chief constituent, and also egg yolk.

New chemical products include a self-polishing floor wax, flame-resistant transparent paper, and non-poisonous fungicides for fruit trees.

A curious animal that ranged the Texas region in ancient times had a long pronged horn on its nose, resembling a boy's slingshot.

A new automatic postoffice machine, suitable for outdoor use, has been invented in Germany; it weighs, stamps and postmarks letters, and returns correct change from any coin put into the slot.

Italy is about the size of the state of New Mexico.

Tung oil trees are being introduced into New Zealand.

It is believed that about 10,000 tons of metallic copper were mined at the Isle Royal pits, in Michigan, by Indians in prehistoric times.

Snakes are most active when the temperature is between 70 and 90 degrees, are almost helpless at 50, and are inclined to seek shelter above 90.

The famous Tyrian purple dye, which the Phoenicians achieved in small quantities by using thousands of molluscs, was synthesized in 1909, and can be made in the laboratory for about 50 cents a pound.

A new way of catching soft-shell crabs is being tried in Louisiana: hundreds of bunches of leaves and branches are submerged in the water, then the crabs take shelter in them and are rudely shaken out into nets.

WITH THE SCIENCES THIS WEEK

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MEDICINE

Relief for Angina Pectoris, "Most Painful" Disease

Chloroform-Like Drug Inhaled As Routine Treatment Makes Attacks Less Frequent and Reduces Pain

QUICK relief for the world's most painful and most rapidly increasing disease, angina pectoris, has been achieved by the simple inhalation of the chloroform-like drug called trichlorethylene. Dr. John C. Krantz, Jr., of the University of Maryland School of Medicine, Baltimore, reported to the meeting of the American Association for the Advancement of Science.

Patients with the fear of death upon them, dreading the next seemingly inevitable attack of the excruciating heart pain that is said to be worse than childbirth or gallstones, get relief in a second from inhalation when the attacks occur.

As a routine treatment night and morning, crushing an ampule in a handkerchief makes attacks less frequent by a half or third. Clinical tests made by Dr. William Love, Jr., Baltimore physician, were successful in 15 out of 20 cases.

An extract of the pancreas from which insulin has been removed is also effective in the medical fight on angina. Dr. James C. Munch, Philadelphia pharmacologist, made known at the A.A.A.S. meeting. Tested on some 500 patients at New York, Santa Barbara, Mayo Clinic and Philadelphia, it brought seemingly permanent relief from angina attacks in 85 per cent. of the cases.

Some patients needed no more treatment after daily injections for two weeks, others needed weekly treatments for several months thereafter before relief came.

From Diabetes Treatment

Discovery of the usefulness of the pancreas hormone in angina came as a byproduct of the insulin treatment of diabetes. Some patients with both angina and diabetes had both diseases mitigated by the relatively crude insulin of the early days.

As insulin was refined to greater and greater perfection, it became less effective in angina. The scientists therefore looked in the impurities for the substance benefiting angina conditions, and

the pancreas extract now being used resulted.

Dr. Munch estimates that angina pectoris, predominantly a "busy man's disease," magnified by increasing life expectancy, has about sextupled in frequency in the past 20 years.

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ASTRONOMY

Rare Meteor Spectrum Obtained by Astronomer

THE FIRST photograph of the spectrum of a meteor of the Leonid shower to show all the light visible to the naked eye, as well as some of the short ultraviolet waves, was obtained at the David Dunlap Observatory of the University of Toronto. The photograph was made by Dr. P. M. Millman, of the observatory staff, at the time of the shower in November. These are meteors, or "shooting stars," that seem to radiate from the constellation of Leo, in which direction their parallel paths seem to converge, like the tracks of a railroad.

Blue in Color

According to Dr. Millman, "the Meteor appeared at 1:48 a. m., on November 18, and was almost as bright as the planet Venus. It was blue in color, and burst at the end of its path, leaving a train visible for 14 seconds." The photograph was obtained with a small camera, over the lens of which had been placed a prism. Thus, instead of a direct photograph of the meteor, the image was spread out into a spectrum. From such spectra it is possible to tell much about the meteor's constitution.

"The spectrum is of type X," explained Dr. Millman. "That is, it shows very little other than the lines of iron, and is the first Leonid spectrum of this kind to be photographed." The importance of this observation is indicated by the fact that only on 38 previous occasions have meteor spectra been photographed.

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RARE SPECTRUM

Unusual photograph of the spectrum of a Leonid meteor, showing all the light visible to the naked eye, as well as some of the short ultraviolet waves. The photograph was taken by Dr. Peter M. Millman, at the University of Toronto's Dunlap Observatory.

CHEMISTRY

Synthetic Production of Musk and Civet Achieved

PRACTICAL synthesis of the organic chemical compounds in musk and civet that give choice perfumes their odor was reported by Dr. Wallace H. Carothers, du Pont chemist, to the National Symposium of Organic Chemistry.

Chemists are about to manufacture in the laboratory pure essences such as that of "muscone," which if made from the rare musk deer would cost \$40,000 a pound.

A new field of chemistry is opened by the researches of Dr. Carothers and his collaborators, Julian W. Hill and E. W. Spanagel, who have developed a theory and method of control of synthesis of what chemists call "large ring" compounds of high molecular weight.

These large rings of chemical molecules may also prove of use in medicine, as the Chinese use musk in medicine and investigations may demonstrate scientific medical uses.

Based upon the 1926 discovery of the Swiss chemist Ruzicka that the essential principles of musk and civet are

chemicals of large-ring type, the du Pont research has aimed to make this discovery practically available. "Musccone" and "civetone" are the only known examples of such chemicals found in the animal world, the chemists declared.

Lower grade perfumes have long been made synthetically and there are also synthetic imitations of musk. In

fine perfumes the function of musk, although unpleasant in large quantities, is to blend the various odors into a single fragrance as well as to confer permanence on odors otherwise fugitive.

The new chemical research has the possibility of bringing to the boudoir new synthetic odors that nature has not imagined.

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ASTRONOMY

Great Hydrogen Outburst on Sun Preceded Radio Fading

A SUDDEN outburst of hydrogen from the sun preceded the diminution in radio intensity on the earth observed on Oct. 24, R. S. Richardson, of the Carnegie Institution's Mt. Wilson Observatory, reported to the American Astronomical Society.

Mr. Richardson's work followed announcement of such fadeouts by Dr. J. H. Dellinger, chief of the radio section of the National Bureau of Standards. Another such eruption of hydrogen occurred on Aug. 30 when a sudden and mysterious fading of short wave radio transmission was noticed for about fifteen minutes by scientists at the National Bureau of Standards. Fadeouts also occurred on March 20, May 12 and July 6, the interval between them being just about twice the period that the sun takes to rotate.

Dr. Dellinger suggested that they might be associated with some sort of solar eruption, and the Oct. 24 photographs were taken as a result of his request that careful observations be made of the sun at the time of the next expected occurrence. Earlier observations were studied as well.

It was found that an eruption, probably rather small, was recorded in July, but no unusual activity was noticed at the time of the first two dates. However, no observations had been made at the exact time of the fading.

Such a hydrogen eruption is called a flocculus, and Mr. Richardson reported that "when the sun is observed for half an hour each day at this phase of the solar cycle we may expect to photograph about ten such flocculi in one year."

Beginning Oct. 21, photographs of the sun were made by the spectroheliograph, which records the light from a single element, hydrogen in this case, at

intervals not greater than ten minutes wherever possible. Between that date and Oct. 25 a total of 323 exposures were made, an average of one every eight minutes during observing hours. A small flocculus was photographed on the first two days without any sign of great activity, until the time of one exposure made on the 24th.

"On the next image, taken twenty-one minutes later," said Mr. Richardson, "the flocculus had increased in intensity until it was the most conspicuous object on the disk seen in a hydrogen spectroheliogram. It was stronger than the one photographed on July 6, but never reached the intensity of the one on Aug. 30."

Until this date there had been a general improvement in radio transmission in the short wave bands and it had reached the highest value ever recorded at the Bureau of Standards on Oct. 24. There was no sudden fadeout such as those noticed before, but the upper limit of frequency dropped to half of the value on the preceding day, and on the following days returned to the previous high value.

Earlier observations were examined, as well as records of magnetic storms. One very brilliant cloud of hydrogen appeared on June 5, 1925, while the number of sunspots was low, and a magnetic storm followed four days later. An equally brilliant eruption appeared on Dec. 28 and 29, 1928, when the spots were numerous.

"The magnetic character of the day was calm during the eruption and was very calm and at most only slightly disturbed for a week afterwards," it was stated. "Other examples like these might be cited to show the difficulties encountered in attempting to correlate solar and terrestrial phenomena."

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MEDICINE

Breathing Exercises Help Sufferers From Asthma

ASTHMA sufferers at King's College Hospital are being helped by a relatively simple but promising remedy, Dr. Marjorie Gillespie of Glasgow has reported. (*Lancet*, Sept. 28, 1935)

The remedy consists of individually prescribed breathing exercises. Of 75 patients treated by this method, only eleven failed to be helped, Dr. Gillespie reports. These eleven seemed incapable of mastering control of the diaphragm for proper breathing. Older patients were as likely to benefit as younger ones but the length of time the patient had had asthma had much more to do with the results of the treatment. Those who had suffered longer were less likely to be helped.

The theory of these exercises upon which the treatment is based is that asthmatic patients are found to have during attacks congested and narrowed bronchioles through which air could be drawn but could not escape. The aim is to empty the lungs as far as possible, to reeducate the automatic diaphragmatic movements and to diminish chest breathing. When done properly, the exercises tend to relax contracting muscles and make ribs and chest walls more mobile.

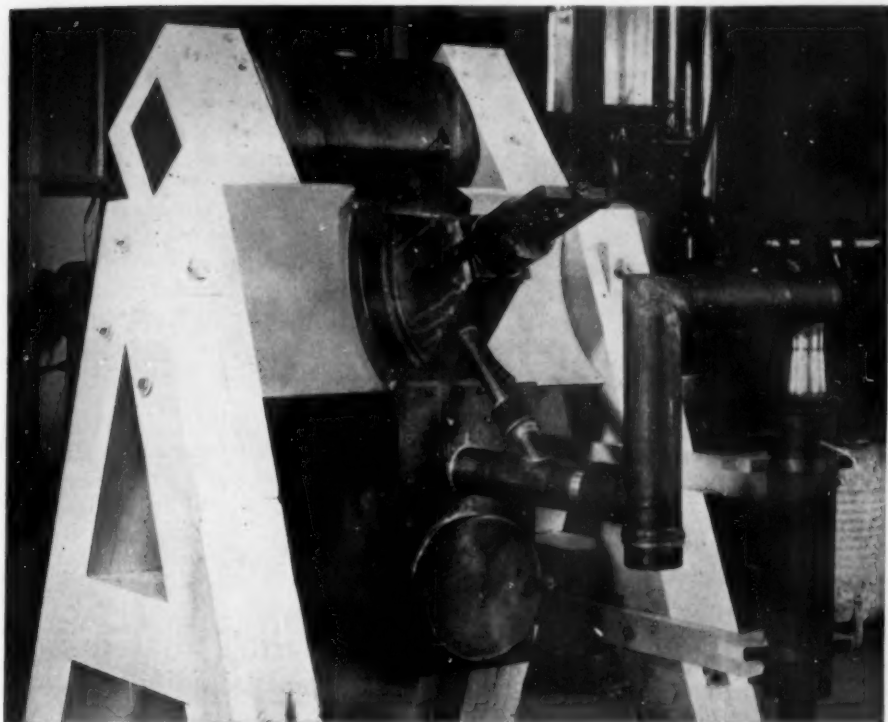
Various types of exercises are used to suit individual patients, since some were found who could do one kind but could not be taught to do a different kind. The patients had with few exceptions been taking various drugs, but as their confidence in the treatment warranted it the drugs were gradually withdrawn, which was usually between four and eight weeks. Besides attending the special classes in breathing twice a week, they were urged to use the exercises whenever an attack seemed imminent.

The doctors at the clinic think the good results may be partly psychological. The nervous tension is reduced whenever a patient feels that he can relieve an impending attack by his own efforts.

Women recovered more quickly than men. About one-half of the patients claimed that they could check almost all but the most severe attacks if they began their exercises at the first suggestion of troublesome breathing.

In Germany Dr. D. K. Schütz has also been treating patients by a similar method. He has added to the breathing exercises a few physical exercises. He reports that two-thirds of his patients have been relieved of their symptoms.

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MAKES LIGHTEST METAL

A magnetic sorting device, a special type of mass spectrograph, with which Dr. L. H. Rumbaugh of the Bartol Research Foundation has separated and concentrated the light isotope of lithium of mass six. Lithium's light isotope can be called the "lightest solid material" ever produced. The separation technique can be likened to the sifting of the wheat from the chaff by the old method of throwing it into the air and letting the wind blow the light chaff away. In Dr. Rumbaugh's apparatus the magnetic field takes the place of the wind and separates lithium of mass six from lithium of mass seven.

PHYSICS

Lightest Solid Ever Found Made at Bartol Laboratories

THE LIGHTEST solid material ever made by man or found on earth has been produced at the Franklin Institute's Bartol Research Foundation laboratories at Swarthmore, Pa.

It is a variety of lithium, lightest metal. It is lithium of atomic weight six, the lightest of the two kinds or isotopes of this element. By comparison iron of atomic weight of over 55 is extremely heavy.

This lightest solid is less than twice as heavy—atom for atom—as the gas helium used by the U. S. Government to inflate its airships.

The production of the world's lightest solid was achieved by Dr. L. H. Rumbaugh who used electro-magnetic means in the Swarthmore, Pa., laboratories. Dr. W. F. G. Swann, director of the

laboratories, gave the first hint of the achievement in a lecture before the New York Electrical Society recently. Only the merest speck of material has yet been attained but as the result of four years of research there is hope of ultimately concentrating, in usable amounts, the rare isotopic varieties of the elements.

Heavy hydrogen, or deuterium, the heavyweight isotope of common hydrogen, was the first of the chemical isotopes to be concentrated. For its identification and concentration Prof. Harold C. Urey of Columbia University recently won the Nobel prize in chemistry. The only other isotope ever concentrated in usable amounts is that of the gas neon, widely used in the red advertising signs, which was produced recently by Dr. Gustav Hertz in Germany.

Concentration of solid isotopes is much more difficult than that of gaseous elements.

Dr. Rumbaugh's Bartol apparatus ionizes lithium so that the atoms have electrical charges upon them and then shoots them into a magnetic field which acts as a sorter to spread different weight isotopes out onto a collecting strip. The magnetic field also acts as a lens to concentrate the ion beam into tiny deposits.

The "lightest" solid as a variety of lithium stands next to hydrogen and helium in the chemist's table of atomic weights. The relative weights of hydrogen, helium and lithium as determined by chemical tests are roughly as one is to four is to seven.

Actually hydrogen's atomic weight is 1.0078 and the gas is composed of hydrogen of atomic weight 1, deuterium of mass two and a trace of hydrogen of mass three, all mixed in such proportions that the average atomic weight comes out to be 1.0078.

Similarly lithium's real atomic weight is 6.940, composed of a mixture of lithium of mass six and lithium of mass seven, with the mass seven variety, of course, greatly predominating.

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PUBLIC HEALTH

Continued Good Health, More Births in U. S.

A CHECK in the thirty-year decrease in the birthrate of the United States and continued good health conditions in general throughout the country were reported to Congress by Dr. Hugh S. Cumming, Surgeon General of the U. S. Public Health Service.

About 94,000 more babies were born in the United States in the calendar year 1934 than in 1933. Later figures are not yet available. The report covers statistics of the U. S. Public Health Service only for the past fiscal year, ending June 30, 1935.

More babies were born but there was also a slight increase in deaths of infants under one year of age per 1,000 births. The infant mortality rate for 1934 was slightly higher than for 1933, but lower than for any year earlier than 1932. The death rate for the general population was also slightly higher in 1934 than 1933, the Surgeon General reported, but again was lower than any recorded rate earlier than 1932. For 1934 the death rate was 10.9 per 1,000 population.

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PALEONTOLOGY

Seek Prehistoric Land Link Between Old World and New

WERE Africa and South America linked by a land bridge, millions of years ago?

The Harvard Museum of Comparative Zoology is sending an expedition late in January to southern Brazil, to seek 175,000,000-year-old fossils that may clear up the mystery.

Heading the party will be Lewellyn I. Price and Theodore E. White, both of the museum staff, whose finding of the world's oldest fossil egg, approximately 225,000,000 years old, was announced a little more than a year ago.

The latest expedition of the pair is designed especially to test the theory held by some geologists, notably Wegener, that the South American and African continents were at one time joined together as a part of prehistoric Gondwana land, which stretched halfway around the southern hemisphere.

Discovery of strikingly similar rock formations and fossilized animals and plants on both continents has given this theory considerable support, although some geologists doubt the hypothesis on the grounds that the South Atlantic

deeps are too old for the continents to have ever been connected.

The region to be visited is the province of Rio Grande Do Sul, in southeastern Brazil, where for more than 100 miles along the Jacuhy river, on the border between the jungle and the pampas, there are rich red sandstone beds of the Triassic age, approximately 175,000,000 years ago.

Extremely rich in reptile fossils, especially those related to the Gondwana hypothesis, this region is practically untouched by scientists. If the fossils from this area resemble those already unearthed in Africa, it will be a strong factor in support of the linkage theory.

The few specimens previously taken from these beds indicate that the Triassic reptiles were about nine feet long and about four feet in height. Despite their heavy tails, they were good runners and were advanced reptiles, approaching the mammal stage.

The Brazilian government is cooperating in the research, which is expected to last for about a year.

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reasonably good accord with the theoretical predictions up to about seventy million electron volts, at which the wave-length of the electron as calculated on quantum theory becomes about equal to its radius as calculated from classical electron theory. At higher energies the action of the electron departs rapidly from the predictions. This means that an extension of present theory of electrodynamics is needed for the regions of strong electric fields, which will be comparable with the extension of Maxwell's electrodynamics introduced by Lorentz and Einstein for the condition of high velocities. If and when such an improved theory is developed, cosmic rays afford one of our very few possibilities for giving it an adequate test."

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PHYSIOLOGY

One of Birth's Mysteries Solved by Hormone Study

ONE of the great mysteries surrounding the way in which human beings come into the world has been solved by discovery that two of the female sex hormones act as the trigger that sets in motion the process of labor that precedes childbirth.

Dr. G. F. Marrion of the University of Toronto reported to the American Association for the Advancement of Science the solution of a riddle puzzling medical scientists, by finding that just before, during and after labor great quantities of active sex hormones flood the mother's body and inaugurate the great experience that each of us must undergo to begin an independent life. The hormones are known as oestrone and oestriol.

During the time that the baby is growing before its birth, the hormones are produced continuously but in ineffective forms. Dr. Marrion found that in the inactive form the hormones are bound up with a kind of sugar, glucuronic acid. When the time for birth comes this combination is broken. It is as though an automobile were kept with motor running ready for service and the clutch were thrown in by the breaking of the fetters that kept the hormones inactive.

A great medical drive to discover the important mechanism of sex and reproduction from the standpoint of glandular secretions has been underway for the past few years. Dr. Marrion's work is one of the latest conquests.

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PHYSICS

Cosmic Rays Promise to Test Needed Super-Einstein Theory

COSMIC rays promise to measure immense movements of astronomical masses in the universe, and also to test a new and needed Einstein-like extension of electrodynamics to high energies and powerful electric fields, above 70,000,000 electron-volts, which cosmic rays themselves have revealed.

These two new future uses of cosmic rays were predicted by Dr. Arthur H. Compton, University of Chicago Nobel physicist, one of the leading researchers on cosmic rays, in an address before the American Association for the Advancement of Science and the American Physical Society.

"Studies of the latitude effect and of the variation of cosmic rays with time of day confirm our belief that the rays

come from very remote distances," Dr. Compton said. "There is some evidence that the motion of the earth with the rotation of the Milky Way affects the rays. If this preliminary indication proves correct, it will mean that the rays come from very remote distances indeed, and they will serve as a useful source of information regarding astronomical motions."

Dr. Compton explained the need of new physical theory and how the cosmic rays may help.

"One of the most important recent developments in the study of these rays is the fact that electrons with such high energies do not excite as much radiation as is required by present electrical theory," he said. "The experiments are in



PROF. E. B. RENAUD

Examining the stone artifacts believed to resemble tools of Old Stone Age man.

ARCHAEOLOGY—GEOLOGY

When Did Early Man First Reach America's Shores?

UNEXPECTED discovery in America of crude stone tools, resembling 500,000-year-old handiwork of Europe's Stone Age, was reported by Prof. E. B. Renaud of the University of Denver.

The find revives the almost abandoned theory that the New World may have been inhabited, after all, in early stages of man's slow climb toward civilization.

Prof. Renaud reported his discovery to anthropologists attending the meeting of the American Association for the Advancement of Science.

Emphasizing that age of these American tools can be determined only after geologists have studied the site, and paleontologists have given an opinion, Prof. Renaud nevertheless declared that resemblance between the Old World's famous types of Stone Age tools and these now found in America "is striking and may be very significant."

The specimens amounting to nearly 1,100 were discovered this summer, the archaeologist stated, when the second Denver-Wyoming Expedition was exploring in southwestern Wyoming. There they found (*Turn to Page 46*)

BELIEF that man lived in America hundreds of thousands of years ago was challenged by Dr. Ernst Antevs at the meeting of the American Association for the Advancement of Science. Man could not have lived in America more than 20,000 years ago, he said, because ice sheets would have blocked his passage.

Only one chance in a million exists that human beings came to this continent at about 40,000 years ago, but no scientific evidence, truly verified, has ever been found to show that he did.

This estimate of Dr. Antevs, based on geological studies of climate of past ages, is much higher, however, than scientists would have accepted a few years ago.

But it discounts the idea that because stone tools of ancient man found in America resemble paleolithic artifacts thought to be 500,000 to 250,000 years old found in Europe, man may have existed in America at such an early time.

Early man developed in dry climates, and so it is that the first signs of man in America are found in the Southwest. Dating of these remains is a problem

for the geologist and the paleontologist, who use the rocks and clays and fossil remains of plant and animal life as clues to what happened on the earth during past ages.

Soil Calendar

For Europe and the northeastern part of the United States a sort of calendar has been worked out based on the tree-ring-like layers found in clay soil, and formed during the disappearance of the ice sheets. This is supplemented by similar layers in the soil in only one place in the world—on the Baltic in northern Sweden—formed by spring floods and summer flows of water and continuing the calendar up to the present day.

This sort of calendar does not exist for the Southwest where the traces of ancient man have been found, but complicated mathematical methods have been worked out for comparing the evidences of ancient climate that are found there with the calendar of northeastern America and Europe and thus gaining approximate dates for these early Americans.

The traces of Folsom man found by Edgar B. Howard at Clovis, New Mexico, for example, were located in an ancient lake bed, long since dry. From the high water mark levels in this region, it is known that they must date to a period of very heavy rainfall that came about 12,000 to 13,000 years ago during the time when ice was disappearing from other parts of the world.

Dates Folsom Man

This places Folsom man, most ancient American known to science, as living in 10,000 or 11,000 B.C.

Records of summer temperatures in past ages are another clue used to apply the "clay-layer" calendar to the Southwest region. Remains of plants and animals in regions far north of their usual habitat tell of a period of warm weather some 7,500 to 4,000 years ago. This post-glacial epoch of warm climate can be placed on the known calendar.

But the old method of telling geological time by the wearing away of Niagara Gorge, although still quoted in modern textbooks, must be abandoned, Dr. Antevs indicated, for the Whirlpool Rapids Gorge has been found to be very much older than it was supposed and was there before the last ice age.

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The European spruce sawfly has devastated thousands of acres of spruce forests in Canada, and this year has attacked evergreens in Connecticut.

SEISMOLOGY

Earthquake Rocks the Dutch East Indies

AN EARTHQUAKE, characterized as "very severe," rocked the Dutch East Indies off the southwest coast of Sumatra on December 27, according to reports received by the U. S. Coast and Geodetic Survey.

The time of the intense quake was fixed at 9:34 p. m., Eastern Standard Time. The exact epicenter is still uncalculated, but its approximate location was 4 degrees south latitude and 96 degrees east longitude.

While seismological stations in Phulien, China; Sitka and College, Alaska; Manila; San Juan; Chicago; Berkeley; Ottawa; Ann Arbor, Mich.; Bozeman, Mont.; Tucson, Ariz.; Honolulu; Franklin Institute, Philadelphia; and Charlottesville, Va., all reported the shocks as very severe, they were so distributed that the exact latitude and longitude of the quake cannot yet be determined.

The region shaken by the quake is on the fringe of the Indian Ocean where the towering range of submarine mountains show themselves as the islands of the Dutch East Indies.

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ARCHAEOLOGY

Lost Ball Finally Found Centuries After the Game

HERE is a new American sport record: a rubber ball used by prehistoric American ball players has been found.

Of all the tall stories regarding lost balls, this one takes a high place. Never before in this ball-playing land has a ball turned up hundreds of years after the games were over and the spectators and players had gone home.

Dr. Charles Amsden, of the Southwest Museum, Los Angeles, announces in *The Masterkey* the finding of the old American sport symbol.

The ball was detected in the Museum, hiding unnoticed among a collection of relics from Arizona and northern Mexico. Dr. Emil W. Haury of Gila Pueblo, Globe, Arizona, brought it to attention.

It is a rounded, flattish lump the size of a small man's fist. It looks like dried clay, but underneath the crust it is hard and black, as well-dried rubber would look.

That Mayas and other Indians of ancient Mexico enjoyed ball games, and

used rubber balls in playing long before Europeans explored America, is well known. The courts in which they played their versions of America's national sport have been found in Mexico's ruined cities. But no ball has yet come to light in Mexico. Early Spanish records testify that the Mayan ball was solid rubber and larger than a baseball. Rings high in the court walls were used as goals.

It has recently been revealed that ball games spread as far north as Arizona a thousand years ago. Two ball courts have been identified. Now, a mashed and hardened ball actually turns up, and is recorded as coming from a Hohokam Indian ruin not far from Casa Grande, Arizona.

A chemist who has analyzed the object reports that it is "a natural, unrefined, and unvulcanized rubber hydrocarbon containing resins, waxes, and organic soluble materials in proportions similar to rubber contained in rubber-bearing plants of North America."

The botanical source of this rubber cannot be determined, the chemist says, without more exhaustive research on the sample and on rubber-bearing plants in southern United States and Mexico.

Of course, says Dr. Amsden, the rubber ball find raises other problems, as new finds in archaeology always do:

"Was it traded from Mexico, or did its users know the secret of extracting rubber from some local shrub? Every effort will be made to find a rubber expert who can give the answer."

Science News Letter, January 18, 1936

GEOLOGY

Glaciers Flow Faster On Warm, Sunny Days

GLACIERS are unlike the rivers to which they have been likened, in one thing at least. A river "just keeps rollin' along," while the rate of flow of a glacier depends in part on the weather.

This has been disclosed in a report of the Harvard-Dartmouth Crillon Expedition, which last summer made hourly observations on the great Crillon Glacier in Alaska, day and night for a whole week. It was found that the ice flowed nearly twice as fast in clear, warm weather as on dark, cloudy days.

Sometimes the ice came almost to a full stop, while at other times it flowed at a rate of more than two feet a day.

The expedition was under the leadership of Bradford Washburn.

Science News Letter, January 18, 1936

IN SCIENCE

PALEONTOLOGY

World's Largest Insect Died 150,000,000 Years Ago

FOSSIL remains of the world's largest insect, a prehistoric dragonfly nearly two and one half feet long, that was king of the air about 150,000,000 years ago, have been found near Elmo, Kansas, by Dr. Frank M. Carpenter of the Harvard Museum of Comparative Zoology.

Although only a part of one wing was discovered, the fact that many other smaller insects of a similar type have been found in excellently preserved condition, has enabled scientists to gauge accurately the size of this entire specimen. The huge insect was a member of the *Protodonata* group which lived in the Permian Age, about 150,000,000 years ago, when there were no birds or mammals on earth but only fish, amphibians, reptiles and invertebrates. With long thin bodies and good sized wings, these insects were the most powerful that ever lived and were undoubtedly supreme in the air in their time. They were exceptionally speedy and were so strong that they could cover great distances in one continuous flight. Their diet consisted mainly of smaller insects, probably cockroaches to a great extent, since these were also very plentiful at that time.

Harvard expeditions to these same limestone beds in Kansas in which this giant specimen was found, have already discovered more than 8,000 prehistoric insects. Vast swamps once covered this region and the insects which fell into the calcareous mud have been exceptionally well preserved in the finely grained limestone. Thus scientists can study the hairs, veins and every minute detail of these insects in exact likeness in stone today.

The only other insect ever found approaching this Harvard specimen was discovered in France about 50 years ago. Not quite as large as the latest specimen, this insect was a member of an allied genus, *Meganевра*, which lived during the Carboniferous Age, some time before the Permian.

Science News Letter, January 18, 1936

NE FIELDS

BIOLOGY

Auxin, Growth Stimulator, Found in Chick Embryos

AUXIN, the substance formed by living things that stimulates growth, has been found in chick embryos, by Drs. True W. Robinson and Gilbert L. Woodside of Harvard University. They described their research in a paper presented before the meeting of the Zoological Society of America.

Auxin was first found in plants, and its effects have been studied most on plant growth. It was at first thought to be a monopoly of plants, but lately has been obtained from a number of animal sources, of which the chick embryos reported are the latest. Drs. Robinson and Woodside stated that they have also found auxin in the larvae of blowflies.

Science News Letter, January 18, 1936

GENERAL SCIENCE

Four Aims of Science Listed by Dr. Compton

SCIENTIFIC search for industrial and other new outlets for farm products, to do away with present temporary need for crop limitation;

Scientific improvements in industrial processes, to rid industry of its present self-imposed incubus of tariffs, quotas, and other legislative coddling that handicap efficiency;

Scientific attack on still-unconquered diseases, particularly the debilitating and disabling, rather than the deadly;

Finally, research in pure science, as the springboard for forward leaps in the applied sciences.

This was the fourfold platform laid down by Dr. Karl Compton, president of the American Association for the Advancement of Science, president of the Massachusetts Institute of Technology, and late Chairman of President Roosevelt's Science Advisory Board in an address at St. Louis. Dr. Compton had been asked to talk on the subject "What's Next in Science?"

The speaker laid especial stress on the need for finding new outlets for

agricultural products, to supplement the traditional uses as goods, and fabrics. He looked especially to chemistry as agriculture's ally in this quest.

"The great problem of agriculture today is to discover new uses for these products," said Dr. Compton, "uses which will create new social values or partially replace the consumption of our exhaustible natural resources. Silk from wood, rubber from weeds, and motor fuel (alcohol mixed with gasoline) from corn and potatoes are actual examples of what can be done. Experience justifies belief that, along such lines, science may create new demands for farm products which will provide a constructive and permanent solution of the agricultural problem."

Concerning the possible contributions of science to industry, Dr. Compton continued: "I believe that a second line of increased activity in applied science will occur in industry—particularly in those industries which have hitherto depended largely on tariff protection, on monopolies, on exploitation of natural resources, on governmental subsidies or simply on momentum of past strength. These supports are temporary and precarious; sooner or later they fall before science, because no amount of artificial protection can permanently maintain an obsolete product, an inferior process or a moribund organization against competitors which are based on scientifically improved products or methods."

Dr. Compton's address was broadcast over the network of the Columbia Broadcasting System.

Science News Letter, January 18, 1936

CHEMISTRY

Sea Water Made Drinkable By New English Process

SEA WATER can be converted into fresh water by a new method developed in the British Government's experimental laboratories at Teddington.

The water is first passed through tubes of a synthetic resin made of formalin and tannic acid. These tubes absorb into their walls all the basic, or metallic and alkaline chemical elements. Then the water is passed through a second set of tubes made of a different kind of synthetic resin, compounded of formalin and anilin. These take out the acid-forming chemicals.

The emerging water is fit to drink, though admittedly not particularly palatable. In any case, however, it is quite suitable for use in steam boilers and for other industrial purposes.

Science News Letter, January 18, 1936

PHYSICS

"Supersonic" Sound Waves Help Make Better Films

PHOTOGRAPHIC films and plates have been much improved, in German manufacturing establishments, through the use of "supersonic" waves—sound waves vibrating so rapidly that they are inaudible to human ears. It has been found that the minute particles of silver bromide, which form the light-sensitive part of the photographic emulsion, are distributed more evenly over the surface, and do not tend to clump together, when the emulsion is treated with these extremely rapid vibrations.

Effects of supersonic waves on emulsions were first studied in the United States some years ago by Prof. R. W. Wood of the Johns Hopkins University and Dr. A. L. Loomis, working in the latter's private laboratory.

Science News Letter, January 18, 1936

ASTRONOMY

Scientists Shown Model of Second Largest Telescope

See Front Cover

A MODEL of the 82-inch reflector telescope and the towering structure now being constructed for the McDonald Observatory atop Mt. Locke in west Texas, was shown at the meeting of the American Association for the Advancement of Science.

"It would be hard to find any more eloquent example of the interdependence of the exact sciences than is represented in this telescope," said Warner Seely, secretary of the Warner and Swasey Company, which designed the instrument. "The precision in design, construction and operation of a telescope may be more obvious because of the distances involved, but the exactness which modern industry demands of machine tools is no less than that which science expects of its most delicate instruments."

The telescope will be one million times more powerful than the naked eye. Its three-ton mirror will have a concave surface approximately $1\frac{3}{8}$ inches deep coated with aluminum $1/1,000,000$ of an inch in thickness. No deviation from a true paraboloid greater than $1/1,000,000$ of an inch can be permitted on the mirror's surface.

The photograph of the model appearing on the cover of this week's SCIENCE NEWS LETTER was taken by the Warner and Swasey Company.

Science News Letter, January 18, 1936

PSYCHOLOGY

How Do We Hear?

Recent Research Suggests Basilar Membrane Acts as Series of Receivers Tuned to Different Wavelengths

By MARJORIE VAN de WATER

WHY does the beautiful high note of Lucretia Bori sound different from the deep tone of Lawrence Tibbett?

You can tell the difference between them, of course. Each note throughout the whole range of the human voice and beyond—through the whole gamut of the entire orchestra from the highest shrill note of the violin to the deep rumble of the bass drum—is distinguished by you from all the others. The physiologist can tell you that each tone is a vibration of a different speed or frequency. Young people with good hearing can hear frequencies of from 20 per second to 20,000 per second. But how can your hearing apparatus distinguish these different frequencies?

The delicate, sensitive mechanism in your ear that makes this possible is still a mystery to scientists. No one knows for certain just how it works.

Is your ear like a telephone? Does it send along all the sound impulses, just as they come into the ear, over the same nerve pathway to the central exchange in the brain, where they are sorted out and recognized as different from one another?

Or is the important inner part of your ear more like a battery of radio receiving sets, each one tuned to pick up a different wavelength? Does one area pick up the shrill note of the peanut whistle, and an entirely different part pick up the thunder of a passing elevated train? Does each sound then travel to the brain by a different nerve pathway and perhaps reach a different final destination?

Research Difficult

One reason for the mystery is that it is not possible to watch an ear in operation. Hearing is an intangible sort of thing—it is not visible.

But in spite of this obstacle to research, scientists have discovered much about how hearing takes place. Now they have even mapped the inner ear to show just at what spot any particular note is picked up and sent on its way to the hearing center in the brain.

Physiologists have long tried to trace the pathway of sound from its source to the brain where you become aware of it. The first steps are fairly simple and have been known a long time.

Everyone knows that sound enters by the outer ear into the small opening to the hearing machine itself. It comes to the ear as an air wave or vibration.

First the sound wave in the air strikes a membrane stretched across the opening and sets this eardrum in motion. Next the vibrations are transmitted through three little bones called, because of their shape, the hammer, the anvil, and the stirrup, to the inner ear. Here the certainty of scientific knowledge becomes mixed with theory and speculation or scientific guess. Here is another membrane, but this one is not stretched over an opening like a drum, but is coiled up like a garden snail in its shell. It is very tiny. Uncoiled, it is only $1\frac{1}{4}$ inches long. At its widest end it measures about $1/75$ inch across; it gradually tapers until at the other end it is only $1/600$ of an inch wide. It is as though you took a very fine hair and trimmed a wedge-shaped slice off it.

Picks Up Vibrations

Somehow this basilar membrane, as it is called, picks up the vibrations and transmits them to the sense cells which in turn are connected with the nerve fibers of the auditory nerve. In this way the vibrations give rise to nerve impulses which are conveyed to the brain. But scientists differ about how this part of the hearing machine works.

"Listening in" on the hearing nerve of a cat gave the first clue. Two ingenious psychologists at Princeton University, Drs. E. G. Wever and Charles W. Bray, were the scientific detectives who thus "tapped the wires" of the cat's hearing apparatus.

The impulse traveling up the hearing nerve to the brain gives rise to an electrical impulse, they found. This electric impulse can actually be picked up on a telephone wire, and when it has been amplified, just as the tubes in your radio amplifies the radio waves, it can be heard by the listening scientist. Thus, if someone whistled near the cat's ear, the sci-

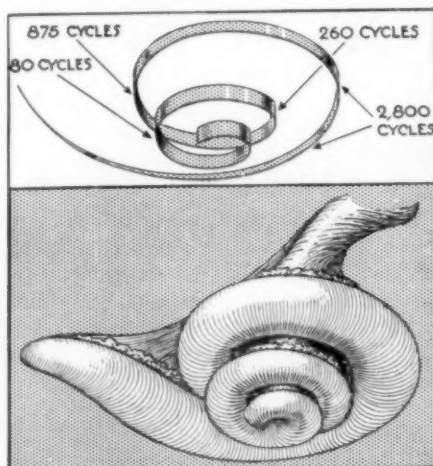
entist in another room could hear that same whistle over the telephone connected only to the cat's hearing nerve. If a high C were sounded, the sound in the telephone would be high C. If middle C were sounded, middle C would be picked up.

Here seemed to be confirmation of the "telephone theory" of hearing. According to the telephone theory, the basilar membrane has no other office than to translate the sound vibrations carried through the bone into nervous currents of the same frequency. These currents then travel unchanged to the brain.

There, in some unexplained manner, the brain sorts out the frequencies and you hear them as sounds of different pitch.

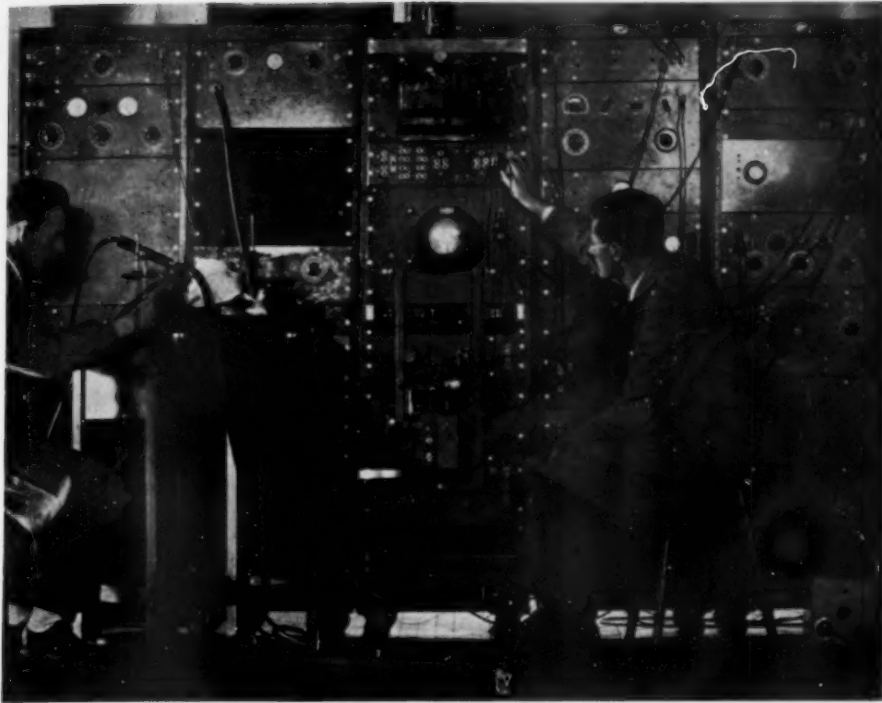
Too Fast for Nerve

The first difficulty encountered by those who favored the telephone theory is that the human nerve fiber does not seem capable of carrying such rapid impulses. Sounds are audible when the frequencies are as great as 20,000 a second. Yet it does not seem likely that any



COCHLEA

The important part in your inner ear which picks up sounds and sends them on to your brain is shaped very much like a garden snail curled up in his shell. This coiled membrane which is contained in the snail-shaped part of the inner ear is partly made up of about 24,000 tiny fibers running crosswise of its narrow width. Each area is thought to be "tuned" to pick up tones of different frequencies. In a guinea-pig, the outer turn picks up the extremely high sounds above 2,800 cycles. The final inner turn seems to pick up the deep low notes below 80 cycles.



LISTENING IN

Dr. H. Davis (right) is plugging in so that the sound in a guinea-pig's ear will be picked from his hearing nerve and reproduced, amplified, in the loud speaker to the extreme right of the picture. Thus the ear of the guinea-pig does the job of a broadcasting studio microphone. The man working at the table on the left is Dr. A. J. Derbyshire. The scene is the laboratory at Harvard.

nerve fiber can respond to frequencies much greater than 1,000 a second. Nerve fibers must have a resting period after each impulse is carried; this rest, or refractory, period precludes the possibility of such rapid response.

A modification of the theory was therefore proposed in 1929 by scientists, including the late Dr. Leonard T. Troland of Harvard. It might be that there is a division of labor among the nerve fibers, he suggested. Although no single nerve fiber could respond to the higher frequencies, it might be that a single fiber would respond to every other sound wave or every third wave. Other fibers alternating with them would make it possible for the whole bundle of fibers to transmit the sounds to higher frequencies.

Confirmation

Confirmation of this suggestion came with further research at Harvard by Drs. H. Davis, A. Forbes and A. J. Derbyshire. They picked up action currents from the hearing nerve of a cat, following the same method of Drs. Wever and Bray, except that instead of listening in, they measured the frequencies picked up with a cathode ray oscillograph.

They found with this apparatus that

when the sound reaching the ear of the cat was of a frequency of 700 or lower—that is, below the upper limit of the cello or alto singing voice—the frequency of the action current that goes up to the brain is exactly the same.

Sharp Drop

Between 700 and 900 cycles, however, a sharp change occurs in the size of the waves picked up. It drops to approximately half the size of those produced by equally loud sounds of lower frequencies. The sharp drop in the amplitude of the wave to half size was interpreted as meaning that at 700 to 900 cycles the nerve fibers had reached their speed limit and each was now responding to only one of each two successive waves. Since only half the fibers responded to any one wave, the size of the response was only half as great as when all were working.

At a frequency of 1,700—somewhere among the high notes of the flute and violin and above the limit of the clarinet—another drop occurs, indicating a breaking up of the nerve fibers into three groups, each responding to every third wave.

So far, the facts seem to be in confirmation of the "volley," or division-

of-labor, modification of the telephone theory. But, unfortunately for that theory, the research was carried still further.

When the pitch of the sounds was still higher, that is, at frequencies of 2,800 or above, the responses became completely irregular. The auditory nerve, even by means of rotated activity among the fibers, cannot transmit frequencies above 2,800, it would seem. Yet these high notes are heard very well. Here the "volley" theory too falls down. Psychologists must seek further for an explanation of how we become aware of the shrill sound of the peanut whistle, or even the highest notes of the violin.

Clue in Structure

Another clue, which may provide the answer to this scientific riddle, is found in the structure and appearance of that puzzling part of the ear, the snail-like cochlea and its enclosed basilar membrane.

When physiologists examined the membrane as a physicist would look at a machine, the appearance of it seemed to suggest the solution of the problem.

When this membrane was unrolled from its spiral and examined, part of it was found to consist of some 24,000 fibers of different lengths—for all the world like a piano as it looks when you lift the cover and expose the grouped strings inside.

Now if you stand in front of the piano and hum a tone, you will notice that the piano repeats this same tone after you. Each string in the piano is tuned to vibrate at a certain frequency. When a note of that frequency is sounded in the vicinity, that string will pick it up.

Why couldn't this same thing happen in the ear, psychologists wondered.

When you hum a certain note, it may very well be that one particular "string" or group of fibers in the membrane picks up the vibration and is set to quivering at a similar rate, they reasoned.

Acts Selectively

Each part of the membrane has attached to it its own nerve fibers. When you hear middle C, the middle C area of the membrane vibrates, and the middle C nerve fibers pick up the impulse and carry it to the brain. When you hear high C, the high C area vibrates and an entirely different set of fibers pick up the impulse, carrying it by an entirely different pathway to the brain and perhaps to a different area of the brain's hearing center.

This is the famous theory suggested

long ago by Prof. Hermann Ludwig Ferdinand von Helmholtz. It was developed as a result of knowledge of physics and examination of the anatomical structure of the ear, but it is now receiving new support from physiological studies of the ear in operation by the aid of new techniques unknown to science in the days of Helmholtz.

Invention of the audiometer was important in this connection. With this modern electrical instrument, it is possible to make precise scientific tests of the hearing of persons for all the many pitches throughout the whole auditory range in much less time.

Lose High Tones

Persons of middle age or older become hard-of-hearing for high notes. Beginning at about forty years of age, tones above high C must be sounded with increasing intensity in order to be heard, and the highest notes that can be heard even when sounded loudest drop from an average frequency of something like 20,000 at 20 years to 10,000 at 60. This old age drop is not so great as it may seem from the figures, for after all it means a loss of only about one octave and that at a pitch way above the highest notes of the piano and those ordinarily used in conversation. Low tones are heard equally well by all normal groups.

This aging of the ears, corresponding to the dimming of eyesight in the aged, has been known for a long time. It was verified by exact tests made at Johns Hopkins University by Dr. C. C. Bunch, who is now at Washington University, St. Louis.

Not Equally Distributed

Microscopic studies of the snail-shaped inner ear were made by a group of Dr. Bunch's colleagues at Johns Hopkins, including Drs. S. R. Guild, S. J. Crowe, and L. M. Polvogt. These studies showed that the nerve fibers are not distributed equally throughout the whole length of the basilar membrane. The number rapidly decreases toward the base of the membrane where, it is now thought, the higher tones are received.

It may be that with age the nerve cells and fibers deteriorate, leaving parts of the membrane useless. The count of nerve fibers on the membrane varies markedly between young persons with normal hearing and hard-of-hearing aged persons. One man of 30 with normal hearing was found to have 25,245 of these nerve fibers. Another man of 63 with impaired hearing had only 4,437. Since the fibers are more widely scattered at the "high" end of the mem-

brane, total deafness would occur there first.

As the records have accumulated, it has been possible to map out the basilar membrane to show just where an injury to nerve cells or fibers will cause deafness to certain tones. This map serves also to indicate just where on the basilar membrane hearing for the different frequencies takes place. The highest tones are picked up by the outer coils of the "snail" where the nerve cells are commonly not so numerous and where the ear's discrimination between neighboring frequencies is not so keen. The lower tones are picked up in a crowded area in the center of the coil.

Similar work on animals done at Johns Hopkins and also at Harvard by Dr. Davis working with Dr. S. S. Stevens have made use of the Wever-Bray listening-in technique to determine what tones were not picked up by animals with injuries to different areas on the basilar membrane. One at a time, the areas for each corresponding tone-deafness were located and plotted on a map. This map agreed very well with that worked out on the basis of autopsies on human ears.

PHYSICS

Experimental Cornerstone of Einstein's Theory Checked

A FOUNDATION stone in the great mathematical structure that is the relativity theory of Prof. Albert Einstein has again been checked and found correct.

This, in essence, is the significance of the highly complex report presented to the National Academy of Sciences on behalf of Drs. F. L. Whipple, T. E. Sterne and D. Norman of Harvard College Observatory.

The Harvard experiment was an unsuccessful new attempt to detect in the speed of light some effect of what is known as ether-drift.

It was the failure of Michelson and Morley to discover an ether-drift that became a foundation for Einstein's relativity theory. It is a question of whether light in different directions with relation to the universe speeds along at the same pace.

The Harvard experimenters used prisms to bend light six times a day, with their spectrograph pointed in various directions. Precise measurements on lines of light showed no changes larger

than the very small probable error of the instrument. Incidentally, the Harvard paper did not mention ether-drift but just gave the experimental results. Scientists will interpret the results as reassuring to the most widely held ideas about the lack of an ether-drift.

Another map made by Dr. Elmer Cul-
lers, of the University of Illinois, was made electrically by applying each of 23 frequencies throughout the auditory range to one place after another on the membrane, until the area of greatest response was located. This map, too, agrees with the others, and together they seem to provide a weight of evidence in favor of the theory that sounds of different pitch are each picked up by a different area on the basilar membrane "tuned" to that particular frequency and thence conveyed to the brain by its own "private wire."

The final chapter has not yet been written in this particular scientific mystery story. Although these experiments on animals do not conflict with what is known of human hearing, scientists know that the results cannot be considered as applying directly to man. Physiologists are still searching with microscope, audiometer, radio hook-ups and every other known device to find out the working principle for this minute, delicate, yet marvelously efficient mechanism, the human ear.

Science News Letter, January 18, 1936

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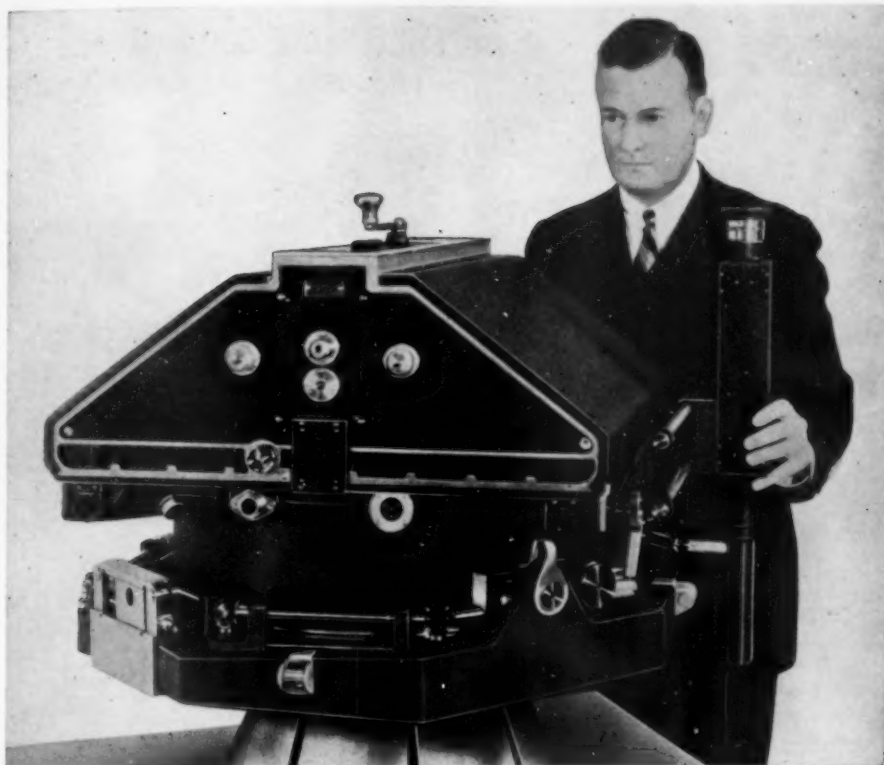
A powerful station for television broadcasting is to be installed on the Eiffel Tower in Paris.

ORADIO

January 21, 4:30 p. m., E.S.T.
REMEMBERING WHILE YOU SLEEP
—Dr. Harry M. Johnson, American University.

January 28, 4:30 p. m., E.S.T.
MIDWINTER HEALTH — Dr. R. R. Spencer, Senior Surgeon, U. S. Public Health Service.

In the Science Service series of radio discussions led by Watson Davis Director, over the Columbia Broadcasting System.



GIANT 9-LENS CAMERA

Sherman M. Fairchild is shown here with the giant nine-lens camera just built for the U. S. Coast and Geodetic Survey by the Fairchild Aerial Camera Company and said to be the largest single unit aerial mapping camera in the world. It has a focal length of eight and a quarter inches and photographs an area of 600 square miles from an altitude of 30,000 feet at one simultaneous click of its nine electrically operated shutters. It is loaded with a film 200 feet long, which is sufficient for 100 exposures.

PHYSIOLOGY

Transplanted Animal Hearts Keep Beating for Months

HEARTS of animals, transplanted to the bodies of other animals, kept on beating as long as their "adopted" bodies lived—a matter of three months or more.

Experiments with this unique outcome were reported before the meeting of the Zoological Society of America by Drs. W. H. Wright and H. H. Collins, of the University of Pittsburgh.

The animals were relatively lowly creatures—red-spotted newts, which are less-familiar cousins of frogs and salamanders. These animals will stand a good deal of surgery, apparently quite without embarrassment. Transplantations of legs and tails are quite an old story to them. You can stick a piece of newt almost anywhere on himself or on another newt, and it will grow. But

hearts had never before been attempted.

The hearts which Drs. Wright and Collins transplanted were taken from animals in their younger stages of development, and transplanted upon the body surfaces of adult animals. In some cases, the whole larval animal was thus grafted on an older individual.

In ten cases the hearts thus implanted continued to beat for more than 100 days, the maximum being 165 days. They stopped only when the "host" animal died, in every case. The blood vessels of an engrafted animal and its new heart frequently remained separate for a time, but finally united, so that both hearts were working on the same circulatory system. In all cases, the new hearts had a beat-rate different from the older hearts of the "host" bodies.

Science News Letter, January 18, 1936

PHYSICS

Improved Method of Chromium Plating Reported

BY FOOLING electricity and making it act differently from normal, University of Michigan scientists at Ann Arbor have developed an improved process for electroplating non-corrosive chromium on other metals. Much special equipment now needed to secure an even deposition of chromium can be discarded, according to Dr. Richard Schneidewind of the department of electrical engineering.

Electricity, including even lightning, takes the path of least electrical resistance and naturally tends to strike high sharp points such as church steeples—or for an electroplating bath, the little bumps and raised places on the metal surface.

Thus most of the electric current goes to the bumps and a heavy deposition of chromium there occurs. But nearby in a hollow place, a coating barely sufficient to cover the surface is secured.

Special networks of wires are used to conduct the current in the electroplating bath into the depressions and attain an even distribution of the chromium metals.

Dr. Schneidewind's new process uses complicated organic chemicals to attain this needed "spreading" effect for the electricity.

With the chemicals in the electroplating bath, the electric current no longer makes a beeline for the high spots but, instead, also plates the hollows.

One manufacturer, for example, found his production of chromium plated frying pans could be increased from 65 to 100 an hour because of the time saved in no longer needing to fit a special loop of wire into each unplated pan.

Science News Letter, January 18, 1936

VITALISM and MECHANISM A DISCUSSION

between

HERBERT V. NEAL

Professor of Zoology, Tufts College

and

JAMES F. PORTER

Is life a blind automatic machine or is it planned and directed to produce pure souls?

25 Cents

SHERMAN M. GOBLE

166 W. Jackson St.

Chicago, Ill.

ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Batty Notions

SILENT, mysterious, flying only by dusk or moonlight, inhabiting caves, and abandoned dwellings, bats have gathered a veritable aura of awe about them. Bat superstitions, originating in early times and among primitive peoples, have persisted to this day. And moderns have added a few false notions of their own, which apparently did not occur to the peoples of antiquity and prehistoric times.

The notion that bats delight in getting themselves tangled in women's hair, for example, seems to be of modern origin. Necessarily so, perhaps, for in ancient and medieval times women usually kept their heads covered in public places. If a bat got tangled in a feminine coiffure, it would have to be set down to sheer accident; for the consequences would obviously be much harder on the bat than on the lady. But bats have an astonishing ability to avoid obstacles of all kinds, even in light that is little better than darkness to the rest of us; and there is not a single really authenticated case of a hair-tangled bat in all scientific literature.

Bats are Clean

Another modern superstition is that bats carry bedbugs and other disagreeable vermin. Bats do have their undesired "inhabitants," like all other mammals including man, but the species that infest them are not the same as our own domestic "pets." As a matter of fact, bats are among the cleanliest of animals, with probably fewer vermin per head than most other mammals. It is injustice to consider them poor housemates on that score.

"Blind as a bat" is an older false be-

lief, based probably on the desperate headlong efforts at escape on the part of bats that accidentally fly into a house. But a bird under the same circumstances dashes against blank walls in exactly the same fashion, and nobody rates birds as blind. If bats look down from the roofs of caves at human beings stumbling about in the semi-darkness of their depths, they might mutter something about being "blind as a man."

To most of us, a bat is simply a bat. That is natural, for they are very hard to catch, and most of us have no particular desire to make their closer acquaintance anyway, harmless and interesting though the little flying beasts are. Actually, however, there are many different bat species—fifty or sixty of them in temperate North America alone.

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From Page 39

what appear to be prehistoric workshops. Stone tools, rejected pieces, scraps, and pebbles litter what Prof. Renaud tentatively describes as ancient river terraces. The principal sites are along the valley of Black's Fork.

Prof. Renaud, who specializes in study of prehistoric man's stone craft-work, has divided the stone objects into five classes. The oldest he pronounces like scrapers and axes made in Europe in the Chellean era of the Old Stone Age. In Europe, this stage of skill and invention in stone work was attained about half a million years ago.

Like Other Cultures

Others of the tools found in Wyoming are like things made in Europe in successive periods of the Old Stone Age. Some fit in with stone techniques of Europe's Acheulian culture, 100,000 years old. Others resemble stone tools made in the Mousterian period, which was the age of Europe's ugly and ungainly Neandertal Men, at least 50,000 years back.

Pointing out that the Wyoming tools match Old World industry through a succession of stages, covering several hundred thousand years, Prof. Renaud said this is the first time such a complex of prehistoric stone industry has come to light in this country.

The Wyoming array of tools is especially significant, he said, in resembling a similar complex of stone craft in Western Europe, which he studied there. The tools also are similar to some made in the Old Stone Age in Egypt, and unearthed along the Nile Valley.

Science News Letter, January 18, 1936

MINING

\$1,000,000,000 In Gold To Come From Earth Yearly

GOLD, worth more dollars per ounce, and piling up in vaults, is stimulating the taking of more gold from the ground. A few years ago even able experts felt that the gold production of the world "seems to have passed its zenith" and would decline. During the World War gold production began to fall alarmingly.

Now the new price of gold has changed the situation, and Dr. Adolph Knopf, Yale professor of geology, predicts that the world output in a few years will exceed \$1,000,000,000 and will remain at that figure for some years. (*Scientific Monthly.*)

The history of gold production, during the past twenty years, according to Prof. Knopf, appears to demonstrate that the main factor in determining production and reserves is the purchasing power of gold.

Billion-dollar-a-year production will produce an equilibrium between production and the present purchasing power of gold and if and when gold's purchasing power declines the world output of gold will decline with it.

Output of gold will be aided to some extent by improvements in mining methods and metallurgy, Dr. Knopf foresees, although these have been brought to a state of very high efficiency.

Improvements in transportation facilities, as exemplified by the airplane, which has accelerated the opening up of such inaccessible regions as the interior of New Guinea and the area of 2,000,000 square miles of Pre-Cambrian rocks north of the Great Lakes, known as the Canadian shield, will lead to new discoveries. Rich placers can not be expected to be found, but lodes will be found, which will at least counterbalance the exhaustion of those now being mined. Geophysical methods of prospecting will help in finding new deposits, as brilliantly demonstrated by the discovery of the first-class deposit at Boliden under the glacial drift of northern Sweden.

From the Russian placers, as the result of the present energetic campaign of the Soviets in mechanization and modernization of equipment, may be expected a steadily increasing output.

Science News Letter, January 18, 1936

The ice plume that blows away from the peak of Mount Everest has been called the highest dust cloud of the earth.

•First Glances at New Books

Exploration

DISCOVERY: THE STORY OF THE SECOND BYRD ANTARCTIC EXPEDITION—Richard E. Byrd—*Putnam's*, 405 p., 94 illus., \$3.75. The Antarctic today is the miracle land of exploration. Admiral Byrd tells vividly of excitements and wonders, but stresses the scientific values of his elaborately organized expedition. Members of the staff gained new light on mineral wealth of coal in the Far South, and studied fossil tree trunks and other paleontological evidence of a past warmer age within two hundred miles of the Pole. Seismic soundings for the first time showed the depth of the ice cap.

Science News Letter, January 18, 1936

Biology

ANATOMY OF THE RAT—Eunice Chace Greene—*American Philosophical Society*, 370 p., \$5. The use of the white rat as a test animal in medical and physiological studies gives this contribution to the study of comparative anatomy a wide range of usefulness. Too technical of course for lay reading, but undoubtedly of interest to workers in many branches of medical science.

Science News Letter, January 18, 1936

Relief Work

PIONEERING WITH THE RED CROSS—Ernest P. Bicknell—*Macmillan*, 281 p., \$2. Whether one is interested in the evolution of the American Red Cross, in the development of charity organizations and social work during the past decades, or in the more dramatic story of rescue and relief work during disasters, this volume of recollections will prove worth reading. The book was published just before the author's death.

Science News Letter, January 18, 1936

Education

THE THEORY AND PRACTICE OF STUDENT COUNSELING—Hugh M. Bell—*Stanford Univ. Press*, 138 p., \$1.

Science News Letter, January 18, 1936

Public Health

AN INTRODUCTION TO PUBLIC HEALTH—Harry S. Mustard—*Macmillan*, 250 p., \$2.50. This book is just what its title proclaims it to be—an introduction to public health. Designed "to orient the student in the field of public health," it can be recommended to many who are not students. The intelligent layman can learn from it cer-

tain fundamental facts of public health. School teachers can make use of the information in the book, even if not engaged directly in teaching health. Nurses, even if they are not doing public health nursing, will find in this volume information with which to answer the questions about health that patients ask them.

Science News Letter, January 18, 1936

Ethnology

HEAD, HEART AND HANDS IN HUMAN EVOLUTION—R. R. Marett—*Holt*, 302 p., \$3.50. Human heads organize experiences to arrive at leading ideas. Human hearts find expression in religion. Hands bring about material progress by skill in arts and crafts. Dr. Marett, of Oxford, writes in stimulating fashion for readers of college student type; that is to say, this is a reflective, philosophic work, which will well repay the unhurried reader.

Science News Letter, January 18, 1936

Traffic Regulation

COLLISIONS IN STREET AND HIGHWAY TRANSPORTATION—Barry Mulligan—*Dorrance & Co.*, 310 p., \$1. Newest addition to the increasing library of books on accidents and their causes. The constructive feature lies in the many suggestions for preventing collisions through altered traffic arrangements. While written for the layman first it can well be read by public officials, municipal employees and transportation men generally.

Science News Letter, January 18, 1936

Aeronautics

AIRCRAFT—Le Corbusier—*Studio Publications*, 16 p., 124 plates with descriptive text, \$2.50. A collection of beautiful pictures showing aviation in all its phases.

Science News Letter, January 18, 1936

Industrial Chemistry

THE MUNICIPAL SMOKE PROBLEM: A brief treatise on the products of combustion of fuels and their effects—H. B. Meller and L. B. Sisson—*Mellon Inst. of Indus. Research*, 20 p., free upon direct request to Mellon Institute.

Science News Letter, January 18, 1936

Reference Books

INTERNATIONAL BOOK OF NAMES; ITALO-ETHIOPIAN WAR EDITION—C. O. Sylvester Mawson—*Crowell*, 312 p., \$2. "A dictionary of the more difficult proper names in literature, history, philosophy, religion, art, music and other studies, together with the official form and pronunciation of the names of present-day celebrities and places throughout the world, with post-war geographical changes duly incorporated." Indispensable for libraries and schools.

Science News Letter, January 18, 1936

Psychology

TAKE IT EASY: THE ART OF RELAXATION—Walter B. Pitkin—*Simon and Schuster*, 224 p., \$1.75. To read this author's entertaining writings is to experience the relaxation he recommends.

Science News Letter, January 18, 1936

Science

SCIENTIFIC PROGRESS IN RECENT TIMES—G. P. Bailey—*Ivor Nicholson and Watson, London*, 227 p., 4s. 6d. British review of recent physical and chemical progress for the layman adhering closely to continental sources. The bibliography, for example, mentions not one book published or written by an American. American science isn't quite that bad.

Science News Letter, January 18, 1936

Chemistry

INTRODUCTION TO INORGANIC CHEMISTRY—G. H. Cartledge—*Ginn*, 609 p., \$3. An undergraduate college text which starts with atomic structure and then goes into the more usual historical style of treatment. Prof. Cartledge confesses that the chemists surrendered the atom to the physicists in 1913 and now must revise their teaching of chemistry in the light of new atomic knowledge developed in the intervening years. His text achieves its broad purpose.

Science News Letter, January 18, 1936

Television

POPULAR TELEVISION—H. J. Barton Chapple—*Pitman Pub. Corp.*, 112 p., \$1. British and German television systems described for the layman.

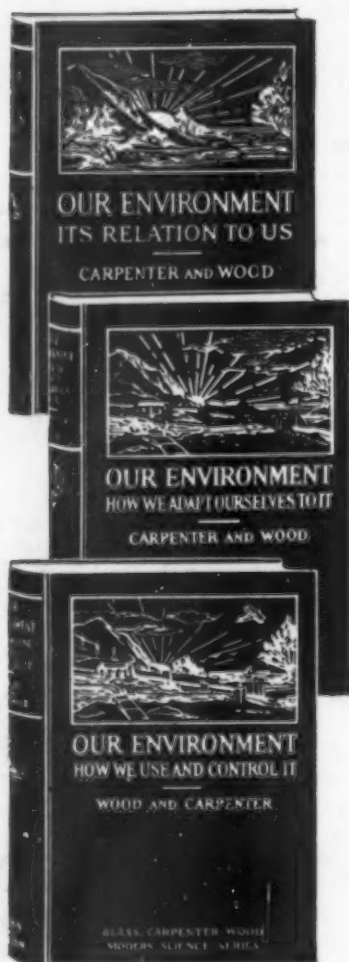
Science News Letter, January 18, 1936

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SOCIAL RESPONSIBILITY

"PHILOSOPHY begins in wonder" is as true today as when Plato used these words.

The wonders of science are a bridge to a true philosophy of life. Tested truths and scientific thinking produce these wonders. They produce also tolerance—the withholding of judgment until the facts are determined—distrust of all superstition and of all conclusions which are not based on carefully determined facts.



It is easy to understand why children begin first to wonder, then to think straight, then to develop a true philosophy which influences their conduct, when they study the simple laws and principles which have developed the railroad, the telephone, the radio which brings the whole world within earshot just by the turn of a knob, the airplane with which we cross the continent overnight.

What events in history are as important as the great scientific discoveries of the past made in the midst of religious intolerance and social unrest, occupying a much smaller place in history than this intolerance and unrest but outweighing both in importance and indeed contributing toward putting an end to both?

Four thousand children studying science selected the following as the ten most important results of science: electricity, radio, pasteurization, telephone, anesthetics, vaccination, medicine, X-ray, modern transportation, purification of water.

The study and investigation of these children has helped them to think straight. So, in ever-increasing measure, science contributes abundantly to right thinking and conduct. As our children share in its teachings, we may expect them to learn increasingly those principles of open-mindedness and unselfish service which will make them tolerant and responsible members of society.

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